

A Tennessee Landowner's Guide to Streambank Protection and Stabilization

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Introduction

Tennessee's streams are one of our state's most beautiful assets, and we are blessed with some of the most diverse and productive water resources in the country. Streams give us drinking water, irrigate our crops, support economic development and industry, offer recreational opportunities, and provide habitat for a diversity of wildlife. By law, the Tennessee Department of Environment and Conservation (TDEC) is charged with protection of the state's surface and groundwater resources for the benefit of all its citizens, and administers regulations established to execute this responsibility. Before performing activities in or along stream channels, it is important to understand the basics about why streams behave the way they do, the best methods for preventing streams from excessively eroding surrounding land, and the regulations that apply. This guide to streambank protection and stabilization gives Tennessee landowners an overview of practical options for streambank protection. For specific questions regarding your particular stream and proposed activities, please contact the TDEC Environmental Field Office near you. For landowners in agricultural settings, your district conservationist with the USDA's Natural Resource Conservation Service is another good technical resource to consult.

Frequently Asked Questions

How can I tell if the water flowing on my property is regulated by the state?

If a channel only flows in direct response to a recent rain event, and is otherwise dry year-round, it may not be considered a stream subject to regulation. If a channel flows continuously for at least part of the year, or carries water for longer than a week after the last rain, it is likely classified as a stream and consequently regulated by the state. In that case, working in the channel may require obtaining and complying with a state permit.

Do I need a permit from the state to perform activities in a stream?

To support protection of the state's water resources, TDEC has developed a permitting program and resources that provide landowners with best practices for stabilizing excessively eroding streambanks and removing logs or trash from stream channels. These permitting programs and best practices are designed to enable landowners to protect their land from more serious damage in the future while protecting water quality. Depending on the scope of activity that you plan to engage in, an aquatic resource alteration permit from TDEC may be required. Any activities involving mechanized digging or grading within stream channels or along stream banks typically require a permit. Selectively removing downed logs or woody debris jams by hand, winch, or chainsaw typically does not require a permit. Cleaning out culverts or pipes clogged by debris, sand, or gravel also typically does not require a permit.

Can I clean trees and brush out of a stream channel?

Permits are not needed to pull downed trees out of streams. However, you may need a permit if you plan to dig out stumps, roots, or otherwise living trees from streams. Streamside trees provide many benefits – holding the streambank in place, providing valuable habitat for fish and other species, and keeping the stream cool. Planting streamside trees and/or limiting livestock access to streambanks are cost-effective means of preventing erosion.

Can I make changes to the channel so that the creek won't flood?

When it rains a significant amount, healthy streams flood. This natural process helps prevent stream bank erosion and excessive downstream flooding by putting some of the power and volume of flood flows out onto the natural floodplain. This process can be managed where necessary, but not wholly prevented. The best way to manage excessive flooding is by allowing stormwater to soak into the ground before it reaches a stream channel, to properly size and maintain structures that allow water to flow under a road, path, bridge, or other stream crossings (also known as culverts), and to remove any large debris blockages, including downed trees. Consider avoiding placement of buildings within the natural floodplain of streams, as these buildings could be damaged when significant flooding occurs.

What is channelization and how does it affect a stream?

Channelization is any activity that straightens, deepens, or widens a stream, including wholesale gravel bed removal. As a result, water flows much faster through the altered stream, often resulting in movement of more gravel and sediment downstream, stripping streambanks of vegetation, and increased erosion and flooding downstream.

Good anglers know that the best fishing is in deep holes or pools. Pools help protect streambanks from erosion by absorbing some of the energy of the flowing water. By removing pools, riffles, and deep holes, channelization can remove habitat for fish and other aquatic life.

Although channelization may appear to solve a problem in the short-term, once channelized streams will constantly work to return to their natural shape and dimensions, which can have unintended consequences both downstream and upstream, including increased flooding, erosion, and associated long-term recurring costs.

Can I use gravel, sand, or cobble from the stream channel to fix eroding stream banks?

Loose gravel or cobble – even from a gravel bar within the stream channel – is not an effective means to fix eroding stream banks and actually will often result in channel destabilization and more significant erosion downstream. Gravel bars do not typically cause erosion or flooding, and are actually a healthy stream component, slowing the water and reducing erosion nearby and downstream. If gravel or cobble is used, it must be combined with living trees or some other permanent, bioengineered solution such as use of anchored or live trees, rootwads, or large rocks, to ensure stabilization.

Stabilizing Streambanks

Streams are naturally dynamic systems that change slowly as they mature and as the landscape around them evolves. As part of this process, streams naturally erode in places, and build up sediment in other locations as they move across the natural landscape. Some conditions that can destabilize or accelerate these natural processes within a stream are:

- Trees that have fallen into the stream can cause the stream channel to change course.
- The removal of shrubs and trees along the streambank can cause streambanks to collapse.
- Allowing livestock unrestricted access to stream channels may destabilize the banks, accelerating erosion.
- Bush and scrub timber pushed into the stream can cause streambank erosion.
- Increased paving and roofing in the watershed can increase stormwater runoff, causing excessive flooding and streambank erosion.

Many landowners in Tennessee lose valuable streamside property to excessive erosion. Fortunately, there are many ways to minimize streambank erosion. The most successful long-term solution is establishing natural deep-rooted vegetation along the streambanks. Planting native trees and woody shrubs along a streambank never requires a permit. Another successful method of streambank stabilization is known as bioengineering. Bioengineering uses natural materials such as trees, roots, and logs to divert water away from a streambank and allow the bank to stabilize. Most bioengineering methods must be adapted to site-specific circumstances, and usually require prior authorization. Before undertaking projects, landowners should contact NRCS or other sources for technical assistance. Successful bioengineering approaches include:

- Cedar tree revetment uses live cedar trees anchored to the base or toe of the bank. Cedars are bushy and slow to rot. As sediment collects in their branches, they provide a natural seedbed for streamside trees such as willows and sycamores to take root and grow. Overtime this revetment is stabilized by the growing root systems of the willows and sycamores and the streambank is restored.
- Live willow stakes cut during winter can hasten the establishment of stream bank protection.
- Use of rootwads from downed trees or limited use of large rock at the toe of the bank to deflect fast-moving water from erodible banks can also be effective bioengineering approaches.
- When unstable streambanks become vertical or undercut, they can be reshaped to a gentler slope and stabilized with native grasses and other vegetation.

Keeping Streams Healthy and Preventing Excessive Stream Erosion

Landowners can use a variety of best practices to maintain the quality of water resources:

- Contour farming helps keep the soil on the land and out of the stream. It also helps to slow down and infiltrate stormwater.
- Landowners can minimize erosion of streambanks and flooding damage by allowing trees and shrubs to grow naturally along streambanks. Consider planting additional natural vegetation to

further control erosion. Use anchored trees, rootwads, large rocks, plants and other natural materials to repair eroding banks.

- Streams are naturally curvy with sloped banks, which help slow the flow of water, reduce its force, and maintain productive pool and riffle habitats. Allowing streams to maintain these natural curves and slopes can prevent erosion. If a stream has been unnaturally straightened, “cleaned out,” or unnaturally sloped, it often will accelerate erosion of its banks and reestablish curves.
- Fencing cattle out of streams, or providing them with only one access point, helps keep the cattle and the water healthy, while allowing natural vegetation to thrive. Use of a solar pump, tanks, ponds, and other contained water sources can provide fresh water to livestock away from the stream.
- Healthy, natural streams move sediment, which includes gravel, and deposit it as “pointbars” or gravel bars in the bends of streams. These pointbars slow the water down, decreasing the damage caused by flooding.
- Keep vehicles and equipment out of the stream whenever possible.
- Conduct ongoing maintenance of pipes and culverts to keep small problems from becoming big problems.

Other Resources

- Information about TDEC’s environmental field offices can be accessed at <https://www.tn.gov/environment/contacts/about-field-offices.html>.
- Information about aquatic resource alteration permits can be accessed on TDEC’s Water Permits page at <https://www.tn.gov/environment/permit-permits/water-permits.html>.
- Information about permitting from the U.S. Army Corps of Engineers (USACE) – Nashville District can be accessed at <https://www.lrn.usace.army.mil/Missions/Regulatory/Obtain-a-Permit/>. Performing certain activities in waters of the United States may require a permit from USACE.
- Information about permitting from USACE – Memphis District can be accessed at <https://www.mvm.usace.army.mil/About/Offices/Regulatory/Applicant-Information/>. Performing certain activities in waters of the United States may require a permit from USACE.
- NRCS offers best practices and technical assistance in streambank protection and stabilization. Information about NRCS Local Service Centers in Tennessee can be accessed at <https://www.nrcs.usda.gov/wps/portal/nrcs/main/tn/contact/local/>.